WHAT IS CLAIMED IS:

1. A system for repositioning teeth from an initial tooth arrangement to a final tooth arrangement, said system comprising a plurality of dental incremental position adjustment appliances including:

a first appliance having a geometry selected to reposition the teeth from the initial tooth arrangement to a first intermediate arrangement;

one or more intermediate appliances having geometries selected to progressively reposition the teeth from the first intermediate arrangement to successive intermediate arrangements; and

a final appliance having a geometry selected to progressively reposition the teeth from the last intermediate arrangement to the final tooth arrangement.

2. A system as in claim 1, wherein the appliances comprise polymeric shells having cavities shaped to receive and resiliently reposition teeth from one arrangement to a successive arrangement.

3. A system as in claim 2, wherein the tooth positions defined by the cavities in each successive appliance differ from those defined by the prior appliance by no more than 2 mm.

4. A system as in claim 1, comprising at least two intermediate appliances.

5. A system as in claim 4, comprising at least ten intermediate appliances.

6. A system as in claim 5, comprising at least twenty-five intermediate appliances.

7. A method for repositioning teeth from an initial tooth arrangement to a final tooth arrangement, said method comprising:

placing a first incremental position adjustment appliance in a patient's mouth, wherein the first appliance has a geometry selected to reposition the teeth from the initial tooth arrangement to a first intermediate arrangement;

successively replacing one or more additional appliances, wherein the additional appliances have geometries selected to progressively reposition the teeth from the first intermediate arrangement to successive intermediate arrangements; and

placing a final appliance into the patient's mouth, wherein the final appliance has a geometry selected to progressively reposition the teeth from the last intermediate arrangement to the final tooth arrangement.

8. A method as in claim 7, wherein the appliances comprise polymeric shells having cavities shaped to receive and resiliently reposition teeth from one arrangement to a successive arrangement.

9. A method as in claim 8, where the tooth positions defined by the cavities in each successive appliance differ from those defined by the prior appliance by no more than 2 mm.

10. A method as in claim 7, wherein the successively placing step comprises placing at least two additional appliances prior to placing the final appliance.

11. A method as in claim 10, wherein the successively placing step comprises placing at least ten additional appliances.

12. A method as in claim 11, wherein the successively placing step comprises placing at least twenty-five additional appliances.

13. A method as in claim 7, wherein the appliances are successively replaced at an interval in the range from 2 days to 20 days.

14. An improved method for repositioning teeth using appliances comprising polymeric shells having cavities shaped to receive and resiliently reposition teeth to produce a final tooth arrangement, wherein the improvement comprises determining at the outset of treatment geometries for at least three appliances which are to be worn successively by a patient to reposition teeth from an initial tooth arrangement to the final tooth arrangement.

15. An improved method as in claim 14, wherein at least four geometries determined at the outset.

16. An improved method as in claim 15, wherein at least ten geometries are determined at the outset.

17. An improved method as in claim 16, wherein at least twenty-five geometries are determined at the outset.

18. An improved method as in claim 14, wherein the tooth positions defined by the cavities in each successive geometry differ from those defined by the geometry by no more than 2 mm.

19. A method for producing a digital data set representing a final tooth arrangement, said method comprising:

providing an initial digital data set representing an initial tooth arrangement;

presenting a visual image based on the initial data set;

manipulating the visual image to reposition individual teeth in the visual image; and

producing a final digital data set representing the final tooth arrangement with repositioned teeth as observed in the image.

20. A method as in claim 19, wherein the step of providing a digital data set representing an initial tooth arrangement comprises scanning a three-dimensional model of a patient's teeth.

21. A method as in claim 20, wherein the manipulating step comprises:

defining boundaries about at least some of the individual teeth; and

moving at least some of the tooth boundaries relative to the other teeth in an image based on the digital data set.

22. A method for producing a plurality of digital data sets representing a series of discrete tooth arrangements progressing from an initial to a final arrangement, said method comprising:

providing a digital data set representing an initial tooth arrangement;

providing a digital data set representing a final tooth arrangement;

producing a plurality of successive digital data sets based on the provided digital data sets, wherein said plurality of digital data sets represent a series of successive tooth arrangements progressing from the initial tooth arrangement to the final tooth arrangement.

23. A method as in claim 22, wherein the step of providing a digital data set representing an initial tooth arrangement comprises scanning a three-dimensional model of a patient's teeth.

24. A method as in claim 22, wherein the step of providing a digital data set representing a final tooth arrangement comprises:

defining boundaries about at least some of the individual teeth; and

moving at least some of the tooth boundaries relative to the other teeth in an image based on the digital data set to produce the final data set.

25. A method as in claim 22, wherein the step of producing a plurality of successive digital data sets comprises determining positional differences between the initial data set and the final data set and interpolating said differences.

26. A method as in claim 25, wherein the interpolating step comprises linear interpolation.

27. A method as in claim 25, wherein the interpolating step comprises non-linear interpolation.

28. A method as in claim 25, further comprising defining one or more key frames between the initial tooth arrangement and final tooth arrangement and interpolating between the key frames.

29. A method for fabricating a plurality of dental incremental position adjustment appliances, said method comprising:

providing a digital data set representing an initial tooth arrangement;

providing a digital data set representing a final tooth arrangement;

producing a plurality of successive digital data sets based on the provided digital data sets, wherein said plurality of digital data sets represent a series of

successive tooth arrangements progressing from the initial tooth arrangement to the final tooth arrangement; and

fabricating appliances based on at least some of the produced digital data sets.

30. A method as in claim 29, wherein the step of providing a digital data set representing an initial tooth arrangement comprises scanning a three-dimensional model of a patient's teeth.

31. A method as in claim 29, wherein the step of providing a digital data set representing a final tooth arrangement comprises:

defining boundaries about at least some of the individual teeth; and

moving at least some of the tooth boundaries relative to the other teeth in an image based on the digital data set to produce the final data set.

32. A method as in claim 29, wherein the step of producing a plurality of successive digital data sets comprises determining positional differences between the initial data set and the final data set and interpolating said differences.

33. A method as in claim 32, wherein the interpolating step comprises linear interpolation.

34. A method as in claim 32, wherein the interpolating step comprises non-linear interpolation.

35. A method as in claim 32, further comprising defining one or more key frames between the initial tooth arrangement and final tooth arrangement and interpolating between the key frames.

18 ~~36.~~ A method as in claim ~~29~~ 11, wherein the fabricating step comprises:

controlling a fabrication machine based on the successive digital data sets to produce successive positive models of the successive tooth arrangements; and

producing the dental appliance as a negative of the positive model.

19 ~~37.~~ A method as in claim ~~36~~ 18, wherein the controlling step comprises:

providing a volume of non-hardened polymeric resin; and

scanning a laser to selectively harden the resin in a shape based on the digital data set to produce the positive model.

20 ~~38.~~ A method as in claim ~~36~~ 18, wherein the producing step comprises modeling the appliance over the positive model.

21 ~~39.~~ A method for fabricating a dental appliance, said method comprising:

providing a digital data set representing a modified tooth arrangement for a patient;

controlling a fabrication machine based on the digital data set to produce a positive model of the modified tooth arrangement; and

producing the dental appliance as a negative of the positive model.

22 ~~40.~~ A method as in claim ~~39~~ 21, wherein the controlling step comprises:

providing a volume of non-hardened polymeric resin;

scanning a laser to selectively harden the resin in a shape based on the digital data set to produce the positive model.

23 ~~41.~~ A method as in claim ~~39~~ 21, wherein the producing step comprises molding the appliance over the positive model.

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42. A method for fabricating a dental appliance, said method comprising:

providing a first digital data set representing a modified tooth arrangement for a patient;

producing a second digital data set from the first data set, wherein the second data set represents a negative model of the modified tooth arrangement; and

controlling a fabrication machine based on the second digital data set to produce the dental appliance.

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43. A method as in claim 42, 24 wherein the controlling step comprises selectively hardening a non-hardened resin to produce the appliance and separating the appliance from the remaining liquid resin.

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44. A method as in claim 42, 24 wherein the appliance comprises a polymeric shell having a cavity shaped to receive and resiliently reposition teeth from an initial tooth arrangement to the modified tooth arrangement.